

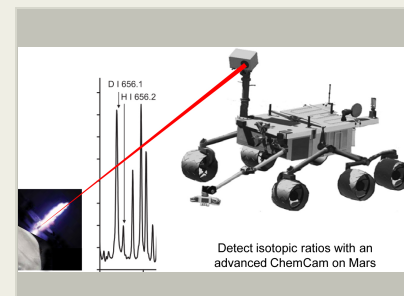
ChemCam-like Spectrometer for Non-Contact Measurements of Key Isotopes, Phase I

Completed Technology Project (2013 - 2013)



Project Introduction

This proposal addresses NASA SBIR topic S1.07 In Situ Sensors for Lunar and Planetary Science, particularly the need for measuring isotopic ratios of the key elements associated with the signs of life (H, C, N, O). We propose a non-contact optical instrument similar to ChemCam that will be capable of measuring not only complete elemental compositions but also isotopic abundances of the key elements in surface materials. We intend to utilize and further develop our recently published technology: Laser Ablation Molecular Isotopic Spectrometry (LAMIS). Our concept is simple, scientifically proven and already endorsed by two innovation awards we received. In Phase I, we concentrate on demonstrating the resolution and sensitivity required to determine these isotopes in synthetic samples and natural minerals relevant to Mars. The immediate focus is on Mars but our concept is also highly germane to future landing missions to the Moon, other planets and their moons, asteroids, and to a broad range of applications in ecology, agronomy, nuclear industry, radio-chemotherapy, forensics, security and other fields. We will advance the development to TRL4 by the end of Phase II with the further aim of integrating our LAMIS detector with a ChemCam-like instrument. The proposed instrument leverages and advances the technology developed for ChemCam. The added strength of measuring isotopes will greatly expand the capabilities of the ChemCam, which is now the most frequently used instrument onboard "Curiosity." In Phase II, we will develop a breadboard prototype of the instrument that can be amended to measure other key isotopes (B, Cl, Mg, Ca, Sr, etc.). We plan further infusion in NASA missions and commercialization in Phases II-Ex and III. Our instrument can be used for stand-alone landing missions or for in situ sample characterization prior to sample return.



ChemCam-like Spectrometer for Non-Contact Measurements of Key Isotopes

Table of Contents

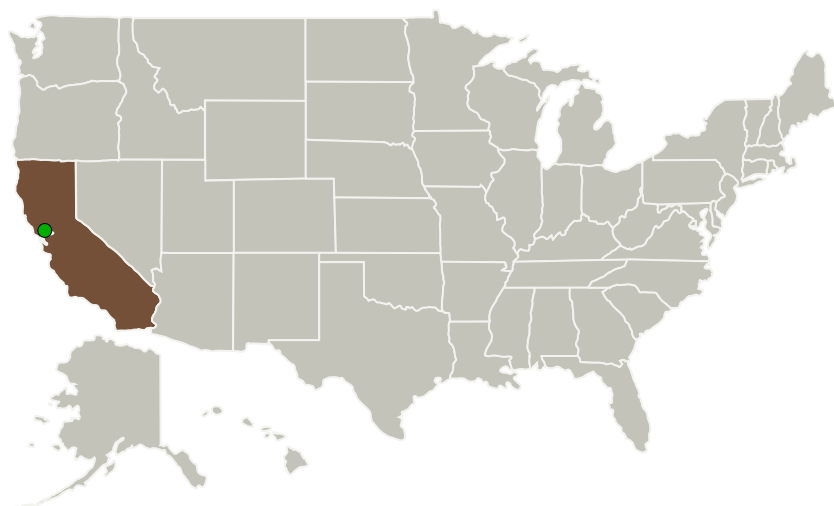
Project Introduction	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Images	3
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

ChemCam-like Spectrometer for Non-Contact Measurements of Key Isotopes, Phase I

Completed Technology Project (2013 - 2013)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Applied Spectra, Inc.	Lead Organization	Industry	Fremont, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California

Project Transitions

**May 2013:** Project Start**November 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140438>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Applied Spectra, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Alexander A Bolshakov

Co-Investigator:

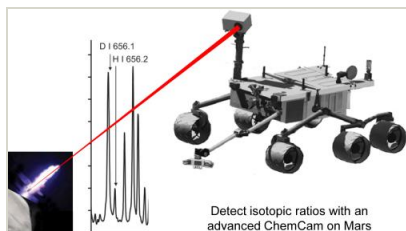
Alexander Bolshakov

ChemCam-like Spectrometer for Non-Contact Measurements of Key Isotopes, Phase I

Completed Technology Project (2013 - 2013)



Images



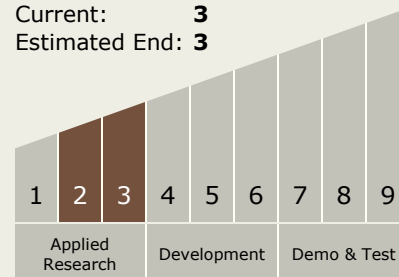
Project Image

ChemCam-like Spectrometer for Non-Contact Measurements of Key Isotopes

(<https://techport.nasa.gov/image/129217>)

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System